BE Project
CE Department
Project ID: BUKC-CE-2020-07
June 2021

Bahria University
Discovering Knowledge

Final Year Project Report

Smart Cart System

Muhammad Osama khan	**51297**
Fasih Shahzad	**51289**
Anas Usman	**51291**

Department of Computer Engineering

Bahria University, Karachi Campus

Submission Performa

Name (1) ..... (Muhammad Osama khan)
(2) ..... (Fasih Shahzad)
(3) ..... (Anas Usman)

Address (1) ..... (H# B-22 Block 10A behind lasania restaurant Gulshan-e-Iqbal)
(2) ..... (Sector 5c2 house no L60 North Karachi)
(3) ..... (House No 81 Block 15 Fb area dastagir Karachi)

Title of Report: Smart Cart System

Project Supervisor's Name: Engr Usra Sami

This report is submitted as required for the Project in accordance with the rules laid down by the Bahria University as part of the requirements for the award of the degree of Bachelor of Engineering. I/We declare that the work presented in this report is my/our own except where due reference or acknowledgement is given to the work of others.

Signatures of students	Date
(1)	1/7/2021
(2)	1/7/2021
(3)	1/7/2021

Signature of Supervisor	Date
.....	1/7/2021

Bahria University
Discovering Knowledge

Intellectual Property Right Declaration

This is to declare that the work done under the supervision of Engr Usra Sami having title "Smart Cart System" carried out in partial fulfillment of the requirements of Bachelors of Engineering in Computer Engineering, is the sole property of Bahria University and is protected under the Intellectual Property right laws and conventions. Bahira University asserts legal and beneficial ownership rights over all Intellectual Property developed as a result of support either directly from or channeled through Bahria University, or created at the request or direction of Bahira University, or developed as a result of utilization of Bahira University Resources including copyright in any material. It can only be considered/ used for purposes like extension for further enhancement, product development, adoption for commercial/organizational usage, etc., with the permission of the university and in adherence to its policies.

The above statements apply to all students and faculty members.

Date: 1/7/2021

Author(s):

Name: Muhammad Osama khan Signature: _____

Name: Fasih Shahzad Signature: _____

Name: Anas Usman Signature: _____

Supervisor(s):

Name: Engr Usra Sami Signature: _____

Bahria University
Discovering Knowledge

Anti-Plagiarism Declaration

This is to declare that the above publication produced under the supervision of Engr Usra Sami having title "Smart Cart System" is the sole contribution of the author(s) and no part hereof has been reproduced illegally (cut and paste) which can be considered as Plagiarism. All referenced parts have been used to argue the idea and have been cited properly. I/We will be responsible and liable for any consequence if violation of this declaration is proven.

Date: 1/7/2021

Author(s):

Name: Muhammad Osama khan Signature: Osama.

Name: Fasih Shahzad Signature: Fasih

Name: Anas Usman Signature: Anas.

Acknowledgments

In the name of ALLAH, the Most Gracious the Most Merciful, at each beginning. We express our appreciation to Almighty ALLAH for showering his blessings and Endowments upon us to finish this project. Despite the fact that our name shows up on the front of this Report. In any case it would not have been conceivable without the kind backing and help of numerous people. We owe a considerable number because of a large number individuals who helped and bolstered us amid the making of the project.

We are exceptionally obligated to Engr. Usra Sami supervisor of our project, for her steady motivation, Bolsters, comprehension and significant help. They have taken the agony to experience the project and make vital adjustment as and when required Express our appreciation to Cdr. Muzammil Hussain Director of Bahria University (Karachi Campus) for his profitable proposals and advice all through the course

I likewise extend my gratitude to our HOD Dr Shoaib Mughal and different faculty members for their participation. we might want to extend our genuine because of our group members Muhammad Osama khan, Fasih Shahzad, Anas Usman for their endeavors and at long I might want to thank my companions for their collaboration to complete the project more importantly, we might want to express gratitude toward Almighty Allah who made all things conceivable

Abstract

Smart cart system based Artificial Intelligence and computer vision introduced to cope up with the change in Technology. In supermarket user come to market and purchase their needed product and pay for their product. Nevertheless, this process is time consuming and doesn't provide any benefit to the customer. So, we break through and come up with an idea of Smart Cart that eradicate all the hurdles just by user adding the products and generating bill on the real time. That is what it combats all inevitable scenarios that is hectic to deal with so we automate thing and in lieu of manual billing Smart cart is generating by itself. That is why we gave the name of Smart Cart to this amazing device.

Table of Contents

1	**INTRODUCTION**	**1**
1.1	PURPOSE OF THE PROJECT	2
1.2	PROBLEM STATEMENT	2
1.3	OBJECTIVES OF THE PROJECT	2
1.4	SCOPE OF THE PROJECT	3
1.5	PURPOSE OF THE DOCUMENT	3
1.6	OVERVIEW OF THE DOCUMENT	4
2	**BACKGROUND AND LITERATURE REVIEW**	**5**
2.1	EXISTING SYSTEM	5
2.1.1	EXISTING SYSTEM DESCRIPTION	6
2.1.2	PROBLEMS IN THE EXISTING SYSTEM	6
2.2	RELATED WORK	6
3	**SYSTEM ANALYSIS**	**7**
3.1	INTRODUCTION	7
3.2	WORKFLOW	7
3.2.1	DATAFLOW	8
3.2.2	WORK BREAKDOWN STRUCTURE	9
3.2.3	TECHNICAL DESIGN	10
3.2.4	IMPLEMENTATION	10
3.3	PROJECT MANAGEMENT	11
3.3.1	GANTT CHART	11
3.3.2	PERFORMANCE OF ACTIVITY BY GROUP MEMBERS	12
3.4	FLOW CHART	13
3.4.1	OVERALL SYSTEM PROCESS	14
3.5	SYSTEM REQUIREMENT	15
3.5.1	CLIENTS CUSTOMERS AND USERS	16
3.6	LOGICAL VIEW	17
3.7	USE CASE DIAGRAM	18
4	**SYSTEM DESIGN**	**19**
4.1	INTRODUCTION	19
4.2	ALGORITHM DONE AS USED	19
4.3	IMPLEMENTATION OF AN ALGORITHM	20
4.3.1	EXISTING SYSTEM	20
4.3.2	PROJECT MANAGEMENT STRATEGIES	20
4.3.3	DEVELOPMENT METHOD	20
4.4	SYSTEM DESIGN	20
4.4.1	SOFTWARE ARCHITECTURE	21
4.4.2	MAJOR MODULES	22

4.4.3 DETAILED SYSTEM DESIGN 22
4.4.4 DETAILED COMPONENT DESCRIPTION 22
4.4.5 USER INTERFACE DESIGN 27
4.4.6 BARCODES 28
5 IMPLEMENTATION 29
5.1 ALGORITHM DONE AS USED TO DETECTING PRODUCTS 29
5.2 FEATURES OF RASPBERRY PI 4 30
5.3 CIRCUIT DIAGRAM 31
5.4 SOFTWARE IMPLEMENTATION FLOWCHART 32
5.5 IMPORTANT LIBRARIES INCLUDE 33
5.5.1 GUI DESIGN CODE 36
5.5.2 DELETE BUTTON CODE 39
5.5.3 PRODUCT INFORMATION CODE 39
5.5.4 DATABASE CODE 40
5.5.5 CAMERA DETECTION CODE 41
5.5.6 SCREEN CODE 42
5.5.7 ADD BARCODE CODE 42
6 TESTING 43
6.1 INTRODUCTION 43
6.2 FUNCTIONAL TESTING 43
6.3 TEST RISK/ ISSUES 43
6.3.1 ITEMS DONE AS TESTED 44
6.3.2 TEST APPROACHES 45
6.3.3 TEST PASS/ FAIL CRITERIA 45
6.3.4 TEST DELIVERABLES 46
6.4 PERFORMANCE TESTING 46
6.4.1 LOAD TESTING 46
6.4.2 TEST APPROACHES 47
6.4.3 TEST PASS/ FAIL CRITERIA 48
6.4.4 TEST DELIVERABLES 48
6.5 STRESS TESTING 48
6.5.1 TEST RISKS/ ISSUES 48
6.5.2 ITEMS DONE AS TESTED 49
6.5.3 TEST APPROACHES 49
6.5.4 TEST PASS/ FAIL CRITERIA 49
6.5.5 TEST DELIVERABLES 49
6.6 SYSTEM TESTING 49
6.6.1 TEST RISKS/ ISSUES 50
6.6.2 TEST PASS/ FAIL CRITERIA 50
6.6.3 TEST DELIVERABLES 50
7 RESULTS AND DISCUSSION 51

7.1 INTRODUCTION 51
7.2 RESULTS OF MODULES 51
7.3 BUSINESS ENVIRONMENTAL RESULTS 51
7.4 APPLICATIONS OF SMART CART SYSTEM 52
7.5 DISADVANTAGES OF SMART CART SYSTEM 52
8 CONCLUSIONS AND FUTURE WORK 53
8.1 CONCLUSIONS 53
8.2 FUTURE WORK 53
8.3 FINAL CASE 54
8.4 FINAL PRODUCT 55
9 REFERENCES 56
APPENDICES 57
APPENDIX A 57

Table of Figures

Figure 1.1 Modular Structure of Smart Cart System 1
Figure 2.1 Existing System Using RFID System 5
Figure 3.1 Workflow diagram of Working Process 7
Figure 3.2 Dataflow diagram of Working Process 8
Figure 3.3 Work breakdown of Whole System 9
Figure 3.4 Gantt Chart 11
Figure 3.5 Basic Working of Smart cart 13
Figure 3.6 Overall System Process Of different phases 14
Figure 3-7 Smart cart Example 16
Figure 3.8 Developmental Approach for system Integration & Prototype Analysis 17
Figure 3.9 Use Case Diagram 18
Figure 4.1 Example of Smart Cart Working 21
Figure 4.2 Raspberrypi 23
Figure 4.3 Liquid Crystal Display 24
Figure 4.4 Camera Raspberrypi 25
Figure 4.5 Power bank 26
Figure 4.6 Interface 27
Figure 4.7 Barcode 28
Figure 5.1 Rasberrypi Labelling 30
Figure 5.2 Circuitry Diagram 31
Figure 5.3 Software Diagram 32
Figure 5.4 Final Case Front 54
Figure 5.5 Final Product 55